

US009638297B2

(12) United States Patent

Son et al.

(54) RACK BAR SUPPORTING DEVICE FOR STEERING GEAR

(71) Applicant: **ERAE AUTOMOTIVE SYSTEMS**

CO., LTD., Daegu (KR)

(72) Inventors: Chang-Wook Son, Daegu (KR);

Seong-Hun Bae, Daegu (KR); Min-Young Choi, Daegu (KR); Jin-Woong Lee, Daegu (KR); Je-Won

Kim, Daegu (KR)

(73) Assignee: ERAE AUTOMOTIVE SYSTEMS

CO., LTD., Daegu (KR)

(*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35

U.S.C. 154(b) by 77 days.

(21) Appl. No.: 14/384,841

(22) PCT Filed: Mar. 4, 2013

(86) PCT No.: PCT/KR2013/001696

§ 371 (c)(1),

(2) Date: Sep. 12, 2014

(87) PCT Pub. No.: WO2013/137576

PCT Pub. Date: Sep. 19, 2013

(65) Prior Publication Data

US 2015/0020619 A1 Jan. 22, 2015

(30) Foreign Application Priority Data

Mar. 14, 2012 (KR) 10-2012-0025993

(51) **Int. Cl.**

F16H 19/04 (2006.01) **B62D 3/12** (2006.01) F16H 55/28 (2006.01) (10) Patent No.: US 9,638,297 B2

(45) **Date of Patent:**

May 2, 2017

(52) U.S. Cl.

CPC *F16H 19/04* (2013.01); *B62D 3/123* (2013.01); *B62D 3/126* (2013.01); *F16H*

55/283 (2013.01);

(Continued)

(58) Field of Classification Search

CPC .. F16H 19/04; F16H 2055/281; F16H 55/283;

B62D 3/123; B62D 3/126

(Continued)

(56) References Cited

U.S. PATENT DOCUMENTS

| 4,095,482 A * | 6/1978 | Kirschner | B62D 3/123 |
|---------------|---------|-----------|------------|
| | | | 74/422 |
| 4,788,878 A * | 12/1988 | Morita | B62D 3/123 |
| | | | 74/409 |

(Continued)

FOREIGN PATENT DOCUMENTS

| DE | 102009028380 * | 2/2011 | | B62D 3/123 | | |
|-------------|--------------------|--------|--|------------|--|--|
| DE | WO 2011101196 A1 * | 8/2011 | | B62D 3/123 | | |
| (Continued) | | | | | | |

Primary Examiner — William Kelleher Assistant Examiner — Randell J Krug (74) Attorney, Agent, or Firm — Novick, Kim & Lee, PLLC; Jae Youn Kim

(57) ABSTRACT

A rack bar supporting device is a device for supporting a rack bar of a steering apparatus of a vehicle toward a pinion shaft and includes a rack bearing and a biasing assembly. The biasing assembly includes an adjustment plug, an adjustment assembly and a support plate assembly. The adjustment assembly includes an adjustment member and a first biasing member. The support plate assembly includes a first support plate, a second support plate, a second biasing member which provides a force for pushing the first support plate along the biasing axis against the second support plate, and a connection structure which connects the first and the (Continued)

